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⑭ 考案の名称 ハニカムエレメント内装のエアクリーナ

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1

⑳ 実用新案登録請求の範囲

巻芯に平板戸紙と波形戸紙を積重して巻層し、その流路に、開閉端を交互に形成してなる円筒状のハニカムエレメントを、円筒状のエア流入側ケースおよびエア流出側ケース中に内装締着するエアクリーナにおいて、ハニカムエレメント長手方向中央近傍の外径を帯状バンドで緊縮し、該バンドの一端を外側へ折曲し弾性パッキンで全周を被覆した環状のフランジを、流入側ケースと流出側ケースで挟圧緊止し、ハニカムエレメントを前記流入、出側ケースで固定したハニカムエレメント内装のエアクリーナ。

考案の詳細な説明

本考案はハニカムエレメント内装のエアクリーナの改良に関する。

そもそも自動車用エアクリーナのエレメントは帯状戸紙をひだ折りして内側に多孔円筒を配設し、その周辺に巻回して菊花状とし、その端部を例えばストラット加締めしてエンドレスとし、ひだ折り戸紙の上下に端板を接着したものが用いられている。

しかし、このエレメントは同一容積内に占める戸過面積が少ないので、最近では平板戸紙と、山部、谷部を交互に設けた波形戸紙を重ね合わせ、これを巻芯に巻層して円筒状となし、その流路の山部、谷部を交互に開端、閉端となるようシール剤で固着したいわゆるハニカムエレメントが用いられるようになってきた。このエレメントは渦巻

2

状の円筒形内に、平板と波形戸紙による通路が設けられているので前記菊花状エレメントに較べ同一容積内のエレメントの戸過面積が遥かに大である。

従来のハニカムエレメントFを内装するエアクリーナAは第5図に示すようにエア流入側ケースCとエア流出口Dを有する流出側ケースE間にハニカムエレメントFの両端円周上に設けた例えば軟質ウレタンフォームで形成する弾性保持材Gを介し締付具Hで固定したものである。

しかしながら第5図および第5図丸印拡大の第6図に示すように、ハニカムエレメントFを流入、流出側ケースC、Eに内装する場合、ハニカムエレメントFの上下、左右の耐圧、耐振力維持のため、断面L字状の弾性保持材GがハニカムエレメントFの両端円周上に例えば接着されているので、第5図、第6図のハニカムエレメントFの破線のハッチング部分はエアが流通せず、其の分だけ戸過面積が減少することになりダスト保持量が少なくなる欠点を有する。

本考案はこの欠点を解消するためのもので、ハニカムエレメントの長手方向中央近傍の外径を帯状のバンドで緊縮し、該バンドの一端を外側へ折曲し弾性パッキンで全周被覆接着した環状のフランジを、流入側ケースと流出側ケースで挟圧緊止して、ハニカムエレメントを固定するようにしたもので以下実施例を図面により説明する。

3

第1図のエアクリーナ10は、エア流入口1を有する流入側ケース2およびエア流出口3を有する流出側ケース4間に、巻芯5（戸紙で巻始めても可）に平板戸紙と波形戸紙を積重して巻層し、その流路8に、開端7と閉端8を交互に形成した円筒状のハニカムエレメント9の長手方向中央近傍の外径を帯状のバンド11で緊締し、そして該バンド11の一端を外側へ折曲しU字を押しつぶした形状の環状フランジ12を形成し、該フランジ12の全周に弾性パッキン13を被覆接着し、前記パッキン13被覆のフランジ12を前記の流入側ケース2および流出側ケース4により例えばボルト締めまたはハンガーボルトあるいはクリップ等の締付具14でハニカムエレメント9を固定したものである。そしてエンジン振動により、ハニカムエレメントFが振れるのを防止するため、例えばハニカムエレメントFの両端外周に弾性材を巻いたり、または流入、流出側ケース2、4の円筒部端に凹環溝（図示せず）を形成する振れ止め15が設けられている。

第2図イは前記フランジ12と弾性パッキン13の一部断面の説明用拡大図であり、さらにハニカムエレメント9を緊締する帯状のバンド11aの説明用一部正面図である。バンド11aはハニカムエレメント9の外径を緊締するのにバンド11aの一端に開口16（図では2個）穿設し、他端には前記開口16と同数の折曲片17を設け、該折曲片17を、開口16へ通過させ締付けながら折曲げるのである。第2図ロはその状態の一部側面図である。第3図イ、ロは他のバンド11bの説明図でバンド11bの一端、他端を逆方向に折曲げホック止部18をもつてハニカムエレメント9を緊締するようにしたものを示したものである。第4図イ、ロはバンド11cの一端に開孔1

4

9を穿設し、他端に立上部20を立設して嵌合後、前記立上部20の上端を拡開して加締めるようにしたもので第4図イはその一部正面図、第4図ロはバンド11cで加締めた状態の一部側面図である。

次に上記構成によるエアクリーナの作用効果を示す。

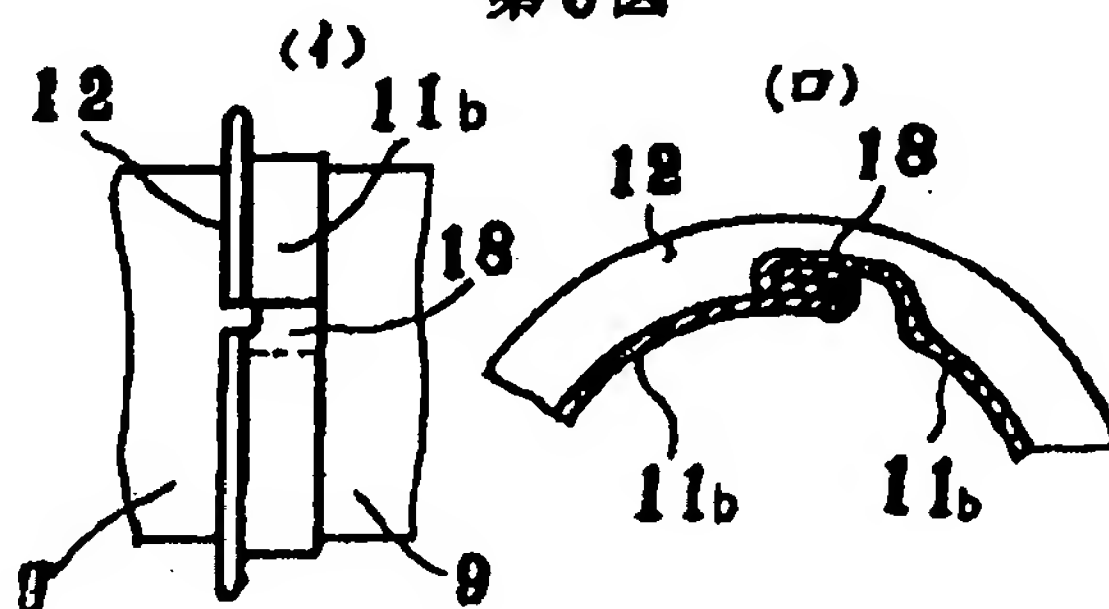
ハニカムエレメントは長手方向中央近傍の外径を帯状のバンドで緊締し、該バンドの一端を外側へ折曲し弾性パッキンで全周被覆接着した環状フランジを、流入側ケースと流出側ケースにより挟圧緊止して、ハニカムエレメントを固定しさらにハニカムエレメントの両端は振れ止めを設けているのでハニカムエレメントの平板、波形戸紙で形成される流路は全面流通するので該ハニカムエレメントは戸過面積の損失がなくダスト保持量が大になる。その上バンドでハニカムエレメント外径が堅固に締付けられ、かつバンドと一体の環状のフランジを全周弾性パッキンで被覆接着し、締付具で流入側ケースと流出側ケースを締付けているので耐振性も優れるという効果がある。

#### 図面の簡単な説明

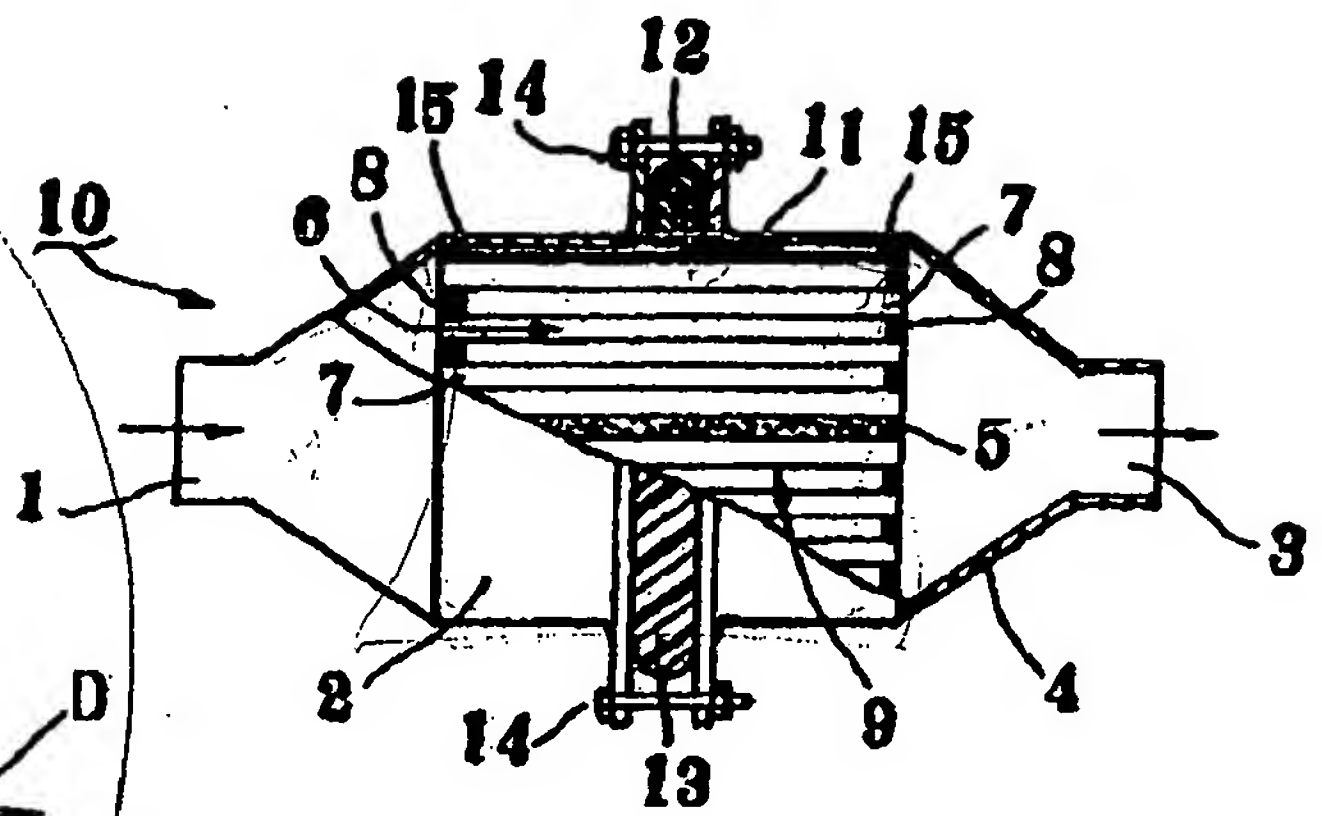
第1図は本考案説明用の一部断面の正面図。第2図イは本考案品の一部拡大図でバンドの実施例を示す正面図、第2図ロはその側面一部断面図。第3図イ、ロはバンドの他の実施例の説明用一部正面図と一部側面図。第4図イ、ロはさらに他の実施例の説明用一部正面図と一部側面図。第5図は従来品の縦断面図、第6図はその丸棒拡大図。

2, C……流入側ケース、4, E……流出側ケース、5……巻芯、9, F……ハニカムエレメント、10, A……エアクリーナ、11……バンド、12……フランジ、13……弾性パッキン。

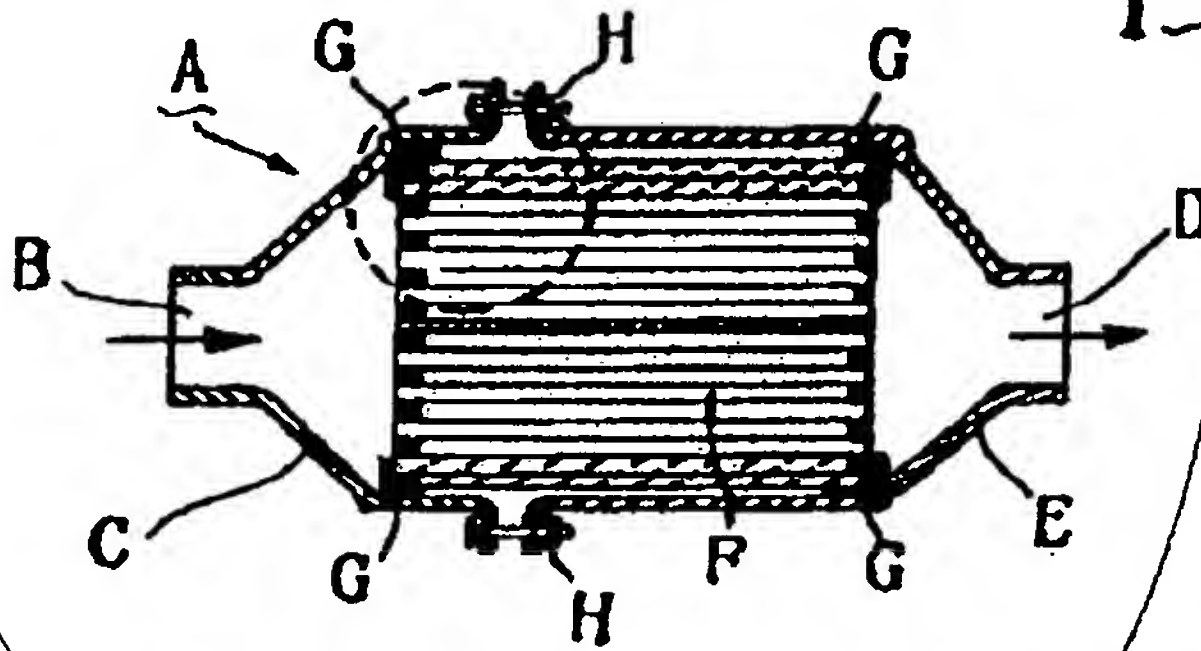
第3図



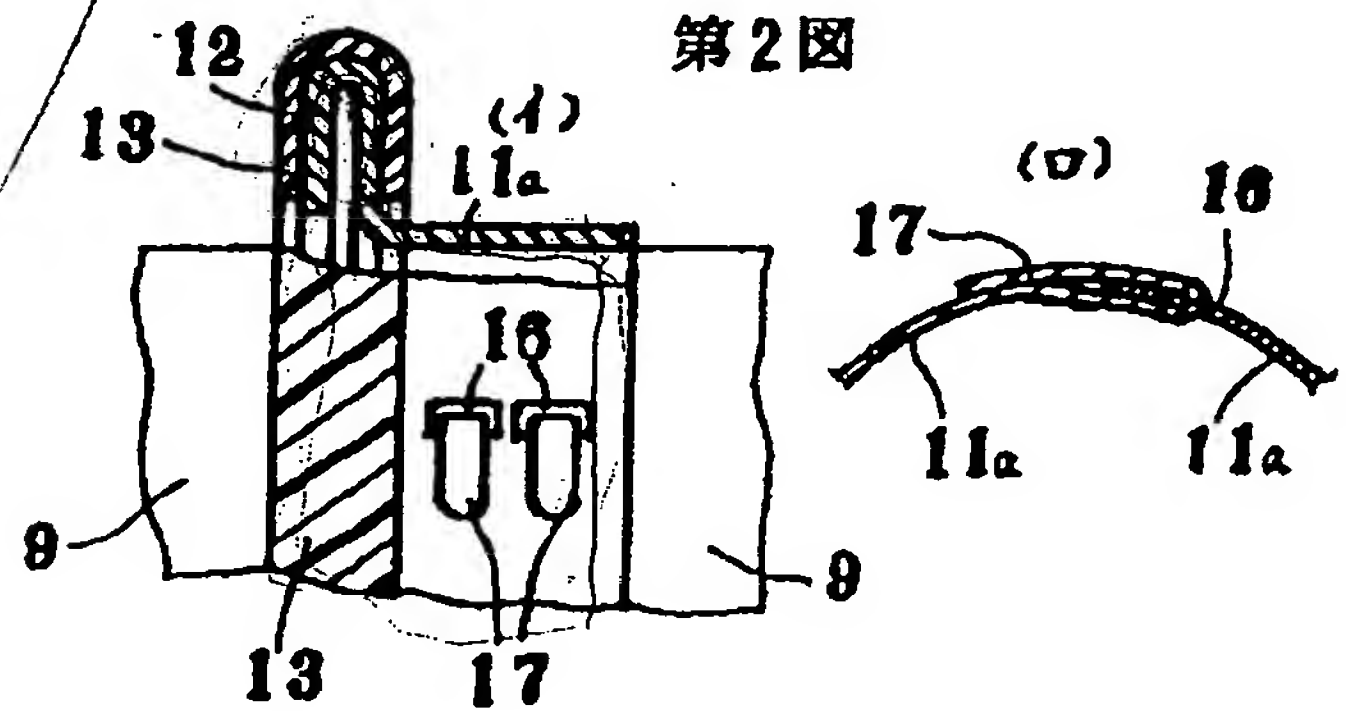
第1図



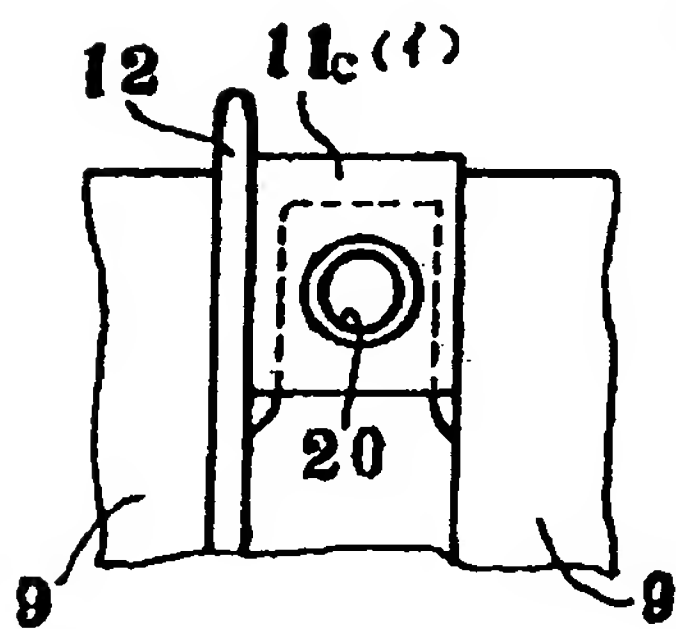
第5図



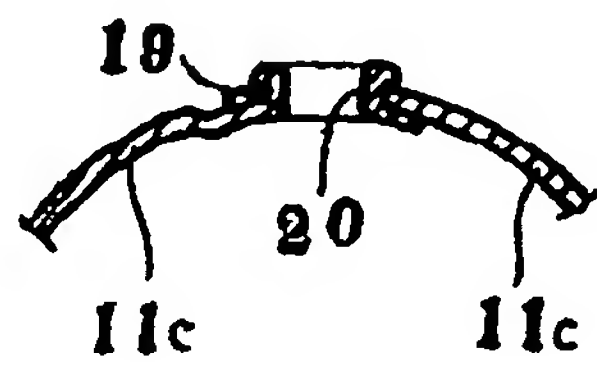
第2図



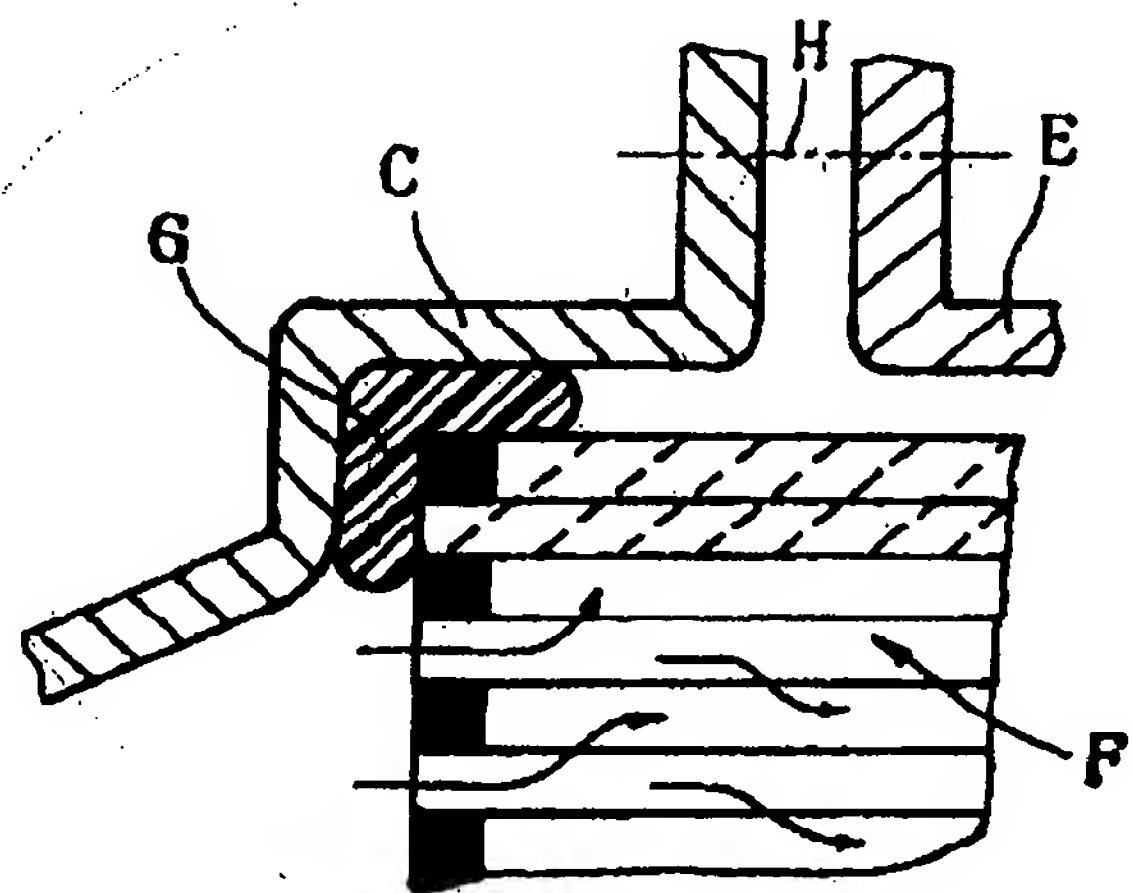
第4図



(口)



第6図



Japanese Utility Model No. Sho 63[1988]-33612

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Job No.: 1604-105563

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AIR CLEANER CONTAINING HONEYCOMB ELEMENT

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[There are no amendments to this utility model.]



### Claim

A type of air cleaner containing a honeycomb element characterized by the following facts: a laminate of a flat filter paper and a wavy filter paper is wound on a winding core; in its flow path, a cylindrical honeycomb element having open/closed ends formed alternately is contained and fastened in a cylindrical air inlet case and an air outlet case; in this air cleaner, the outer diameter near the center in the longitudinal direction of the honeycomb element is fastened with a ribbon-shaped band; one edge of the band is folded outward to form a ring-shaped flange with its entire periphery covered with an elastic packing and held under pressure between the inlet-side case and the outlet-side case; and the honeycomb element is fixed with respect to said inlet-side case and outlet-side case.

### Detailed explanation of the design

The present device pertains to improvement of an air cleaner containing a honeycomb element.

In the prior art, the element of the air cleaner for automobiles is formed by folding ring-shaped filter paper, and having a porous cylindrical pipe set on its inner side, while the periphery is wound into a chrysanthemum shape. The end portion is fastened by means of, e.g., strut fastening, so that it is endless, and end plates are bonded on the upper/lower sides of said folded filter paper unit.

However, for said conventional element, the filtering area for a given volume is small. Consequently, recently, a so-called honeycomb element has been adopted. This type of honeycomb element has the following structure: a laminate of a flat filter paper and a wavy filter paper having crests and troughs set alternately is wound on a winding core to form a cylinder; a sealant is applied such that the crests and troughs of the flow path are alternately opened and closed. For this element, in the vortex shaped cylinder, because the path is set by means of a laminate of a flat sheet and a wavy filter paper, the filtering area of the element for a given volume is much larger than that of said chrysanthemum-shaped element.

Figure 5 is a diagram illustrating air cleaner A containing said honeycomb element F of the prior art. As shown in this figure, inlet-side case C having air inlet B and outlet-side case E having air outlet D are fixed by means of fastener H via elastic holding member G made of, e.g., a soft polyurethane foam, and set on the two end circumferences of honeycomb element F.

As shown in Figure 5 and Figure 6, an enlarged view of the portion defined by the circle in Figure 5, when honeycomb element F is installed inside inlet-side case C and outlet-side case E, in order to maintain the pressure resistance and vibration resistance in the up/down and left/right directions of said honeycomb element F, elastic holder G with an L-like cross-sectional shape is bonded on the circumference of each of the two ends of honeycomb element F. Air does

not flow in the hatched portion indicated by broken lines in honeycomb element F shown in Figures 5 and 6, so that the filtering area decreases corresponding to this portion, and the dust holding quantity also decreases.

The objective of the present design is to solve the aforementioned problems of the prior art by providing a type of air cleaner containing a honeycomb element characterized by the following facts: the outer diameter near the center in the longitudinal direction of the honeycomb element is fastened by a ribbon-shaped band; one edge of the band is folded outward to form a ring-shaped flange with its entire periphery covered with an elastic packing and held under pressure between the inlet-side case and the outlet-side case; and the honeycomb element is fixed with respect to said inlet-side case and outlet-side case. In the following, an explanation will be given regarding an application example.

Air cleaner (10) shown in Figure 1 has the following structure. Between inlet-side case (2) having air inlet (1) and outlet-side case (4) having air outlet (3), cylindrical honeycomb element (9), which is prepared by winding a laminate of flat filter paper and wavy filter paper on winding core (5) (or a filter paper that allows winding to be begun), and which has open ends (7) and closed ends (8) formed alternately in its flow path (6), is set. The outer diameter near the center in the longitudinal direction of the cylindrical honeycomb element is fastened with ribbon-shaped band (11). One edge of said band (11) is folded outward to form ring-shaped flange (12) in a shape like that of a crushed U. On the circumference of said flange (12), elastic packing (13) is covered and bonded. Said flange (12) covered with packing (13) is fastened by, e.g., bolts or hanger bolts or clips or another fastener (14) between said inlet-side case (2) and outlet-side case (4), so that honeycomb element (9) is fixed. In order to prevent vibration of honeycomb element F due to engine vibration, for example, elastic material is wound on each of the two ends of honeycomb element F, or vibration stopper (15) is set by forming a recessed ring-shaped groove (not shown in the figure) on the end of the cylindrical portion of each of inlet-side case (2) and outlet-side case (4).

Figure 2(a) is an enlarged view illustrating a portion of the cross-section of said flange (12) and elastic packing (13). It is a front view also illustrating a portion of ribbon-shaped band (11a) that fastens honeycomb element (9). Band (11a) is for fastening the outer diameter of honeycomb element (9). On one end of band (11a), openings (16) (two of them as shown in the figure) are formed. On the other end, folding pieces (17) in the same number as that of said openings (16) are set. Said folding pieces (17) pass through openings (16) for fastening and while bending. Figure 2(b) is a side view illustrating a portion of this state. Figures 3(a), B illustrate another band (11b). Hooks (18) bent in opposite directions are set on the two ends of band (11b), respectively, for fastening honeycomb element (9). Figures 4A, B illustrate band (11c), which has opening (19) formed on one end, and has rise portion (20) on the other end.

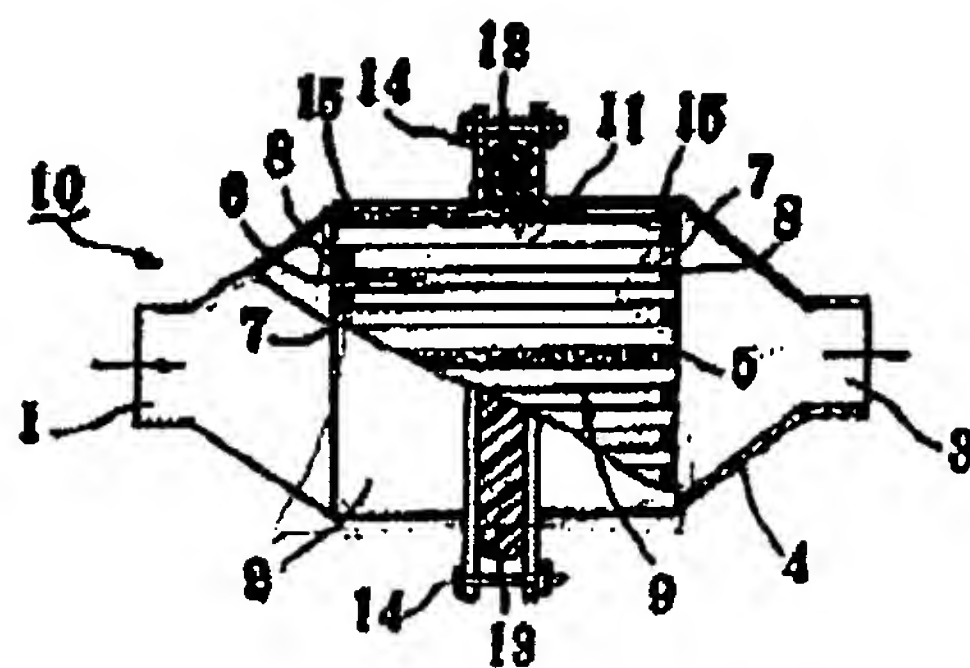


Figure 1

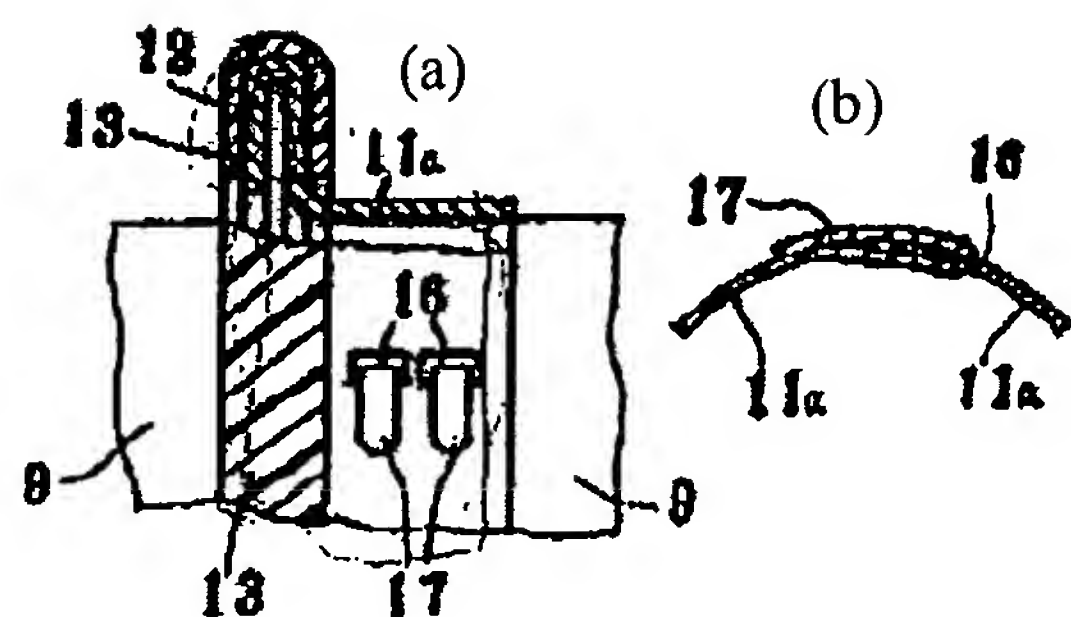


Figure 2

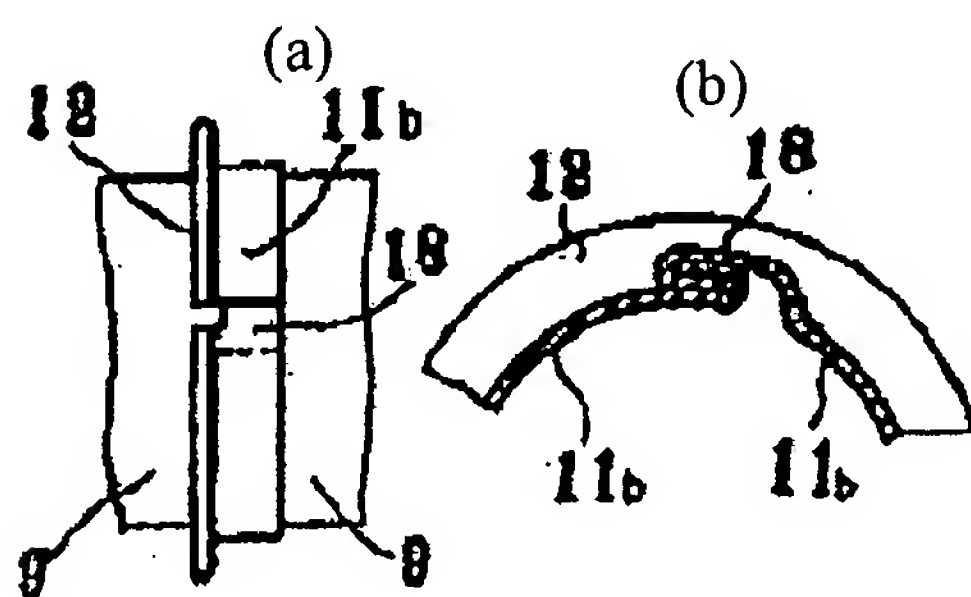


Figure 3

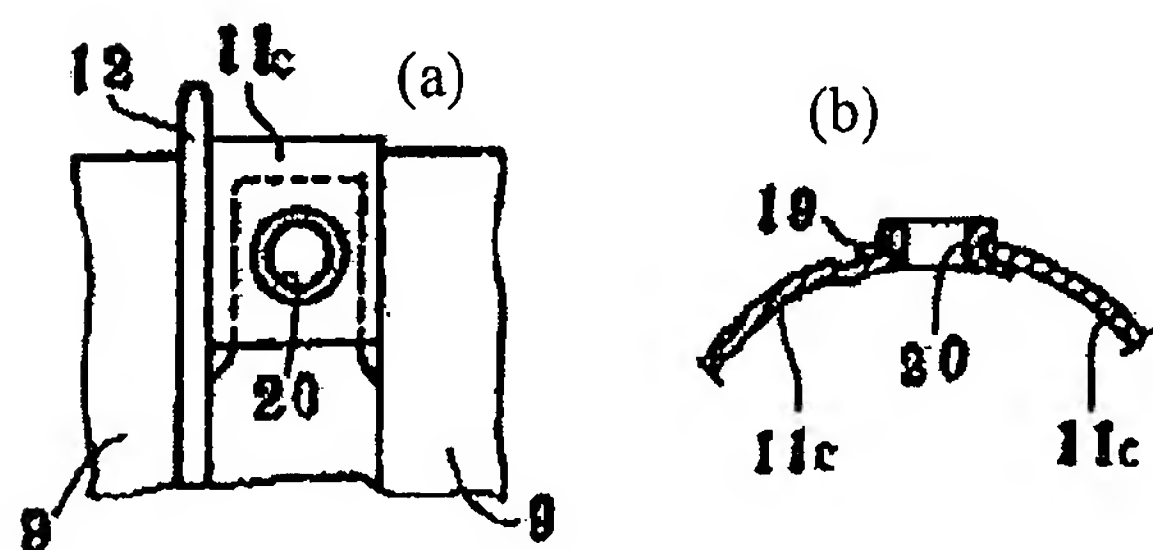


Figure 4



After they are fit together, the upper end of said rise portion (20) is expanded for fastening. Figure 4(a) is a front view illustrating a portion of the structure, and Figure 4(b) is a side view illustrating a portion of the fastened state with band (11c).

In the following, an explanation will be given regarding the operation and effects of the air cleaner with the aforementioned constitution.

For the honeycomb element, its portion near the center in its longitudinal direction is fastened with a ribbon-shaped band. An edge of the band is folded outward to form a ring-shaped flange with its entire circumference covered and bonded with an elastic packing and held and fastened between the inlet-side case and outlet-side case so as to fix the honeycomb element. In addition, the two ends of the honeycomb element are equipped with a vibration stopper, so that the entirety of the flow path, formed with the laminate of flat filter paper and wavy filter paper, of the honeycomb element can be used for flow. As a result, there is no loss in the filtering area of the honeycomb element, and the dust holding quantity is large. In addition, the outer diameter of the honeycomb element is reliably fastened, and a ring-shaped flange integrated to the band is covered and bonded with an elastic packing for the entire circumference, and it is fastened between the inlet-side case and outlet-side case with a fastener. Consequently, it also has excellent vibration-proof characteristics.

#### Brief description of the figures

Figure 1 is a front view illustrating the cross-section of a portion of the present device. Figure 2(a) is an enlarged front view illustrating an application example of the band in the present device. Figure 2(b) is a partial side cross-sectional view of the band. Figures 3(a), (b) are a front view and partial side view for illustrating another application example of the band. Figures 4(a), (b) are a partial front view and partial side view illustrating yet another application example of the band. Figure 5 is a longitudinal side view of the prior art. Figure 6 is an enlarged view of the portion indicated by the circle in Figure 5.

- 2, C Inlet-side case
- 4, E Outlet-side case
- 5 Winding core
- 9, F Honeycomb element
- 10, A Air cleaner
- 11 Band
- 12 Flange
- 13 Elastic packing

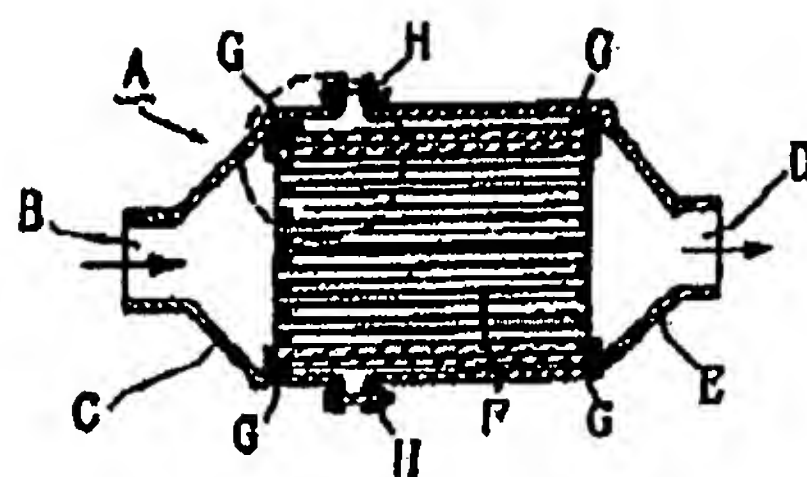


Figure 5

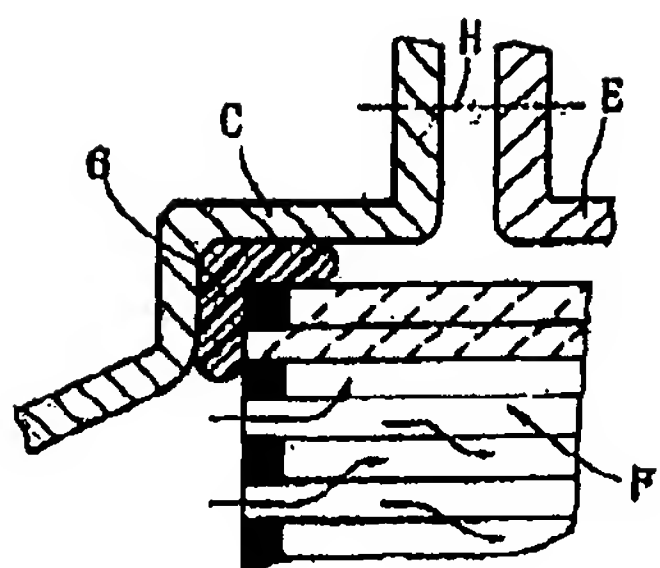


Figure 6